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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/537,158	05/31/2005	Fabio Biscarini	40379/DOB/lp	1458

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EXAMINER	
BURKHART, ELIZABETH A	
ART UNIT	PAPER NUMBER
1762	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS.	03/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/537,158	BISCARINI ET AL.	
	Examiner	Art Unit	
	Elizabeth Burkhart	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *18-23,25-31 and 34-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *18-23,25,26,28-31 and 34-38* is/are rejected.

7)☒ Claim(s) *27* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *5/30/05* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 18-23, 25-31, and 34-38 are pending in the application. Ammended claims 18, 29, and 30, canceled claims 24, 32, and 33, and new claims 35-38 are noted.

The amendment dated 4 March 2007 has been entered and carefully considered. In view of said amendment, the objection to the specification, the 112 first paragraph rejection, and the 112 second paragraph rejection have been withdrawn.

Claim Objections

1. Claim 27 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 27 specifies that the perturbations in Claim 18 may be applied with an optical microscope, a scanning confocal microscope, or a photolithography setup. These examples do not further limit Claim 18 because Claim 18 specifies using a mechanical perturbation and Claim 27 specifies examples of perturbations made with light.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 37 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a mechanical perturbation, does not reasonably provide enablement for a thermal or thermomechanical perturbation, or a perturbation

made with light. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

Despite statements in the specification concerning all of the methods of perturbation (mechanical, thermal, thermomechanical, electrical, magnetic, light) that can be applied on rotaxane and catenane thin films, there is little enabling disclosure of applying a perturbation other than a mechanical perturbation on a thin film of rotaxanes or catenanes. This disclosure represents inadequate support for perturbation methods other than mechanical perturbations.

The subject matter to which the claimed invention pertains is a complex process combining two paradigms of bottom-up approaches to spontaneously form arrays of nanostructures on a substrate with spatially organized structure for information storage. The bottom-up patterning technique comprises depositing a thin film of multistable molecules, which will undergo a morphological transformation when an external perturbation is applied. The transformation then causes the self-organization of the multistable molecules to form nanostructures. The multistable molecules must be chosen by matching several conditions of thin film/substrate surface energy and surface diffusivity of the adsorbate the thin film is made of.

The prior art for information storage on molecular memory systems deposits thin films consisting of rotaxanes or catenanes onto a substrate wherein a mechanical perturbation such as AFM or a stamp is used to apply the necessary energy to cause the morphological transformation of the thin film molecules. "Information Storage Using

Supramolecular Surface Patterns" by Cavallini et al discloses a method for forming nanostructures by depositing a thin film of rotaxanes on a substrate and applying an atomic force microscope or a stamp to said film to cause the transformation (Col. 1, Par. 3 and Col. 3, Par. 2). "Conformational Self-Recognition as the Origin of Dewetting in Bistable Molecular Surfaces" by Cavallini et al discloses forming a thin film of catenanes on a mica substrate and causing the molecules to undergo a wetting/dewetting morphological transformation by external stimuli (Pg. 10826, Par. 2 and 3).

The prior art demonstrates that mechanical perturbations can supply the energy needed to cause the selforganization phenomenon present in rotaxanes and catenanes, but one skilled in the art could not readily anticipate the effects of using a thermal, thermomechanical, or light perturbation on a thin film of rotaxanes or catenanes. The energy supplied to the rotaxane or catenane film by thermal, thermomechanical, or light perturbations would not be equivalent to the energy supplied by a mechanical perturbation, thus using a perturbation method other than a mechanical perturbation would lead to a lack of predictability in the art.

The inventor provides direction to form a thin film of rotaxanes or catenanes on a substrate wherein the film is perturbed by AFM or a stamp. Little is known in the prior art about the nature of the invention and the art is unpredictable, therefore more detail would need to be provided for one skilled in the art to make the invention using other methods of perturbation such as thermal, thermomechanical, or light perturbations without undue experimentation.

The working example in the specification deposits rotaxane 1 onto graphite and perturbs the film with a stamp wherein the applied pressure is 2.5 kg/cm^2. The working example could be extrapolated to any mechanical perturbation since it is known in the prior art that rotaxanes deposited onto graphite or mica can be perturbed using AFM and achieve similar results, but it is not expected that the example could be extrapolated across the entire scope of the claim because the selforganization of rotaxane and catenane films requires energy to initiate the phenomenon and energy supplied from a thermal or light perturbation would not be expected to provide the same results as energy supplied from a mechanical perturbation.

Due to the aforementioned factors, there would be an extraordinary amount of experimentation required to determine a suitable perturbation method to form the desired nanostructures from a rotaxane or catenane film. The examples only specify using AFM or a stamp for the perturbation. Applicant is claiming that thermal, thermomechanical, and light perturbations can also be applied to rotaxanes or catenanes to achieve the desired nanostructure, but the selforganization phenomenon is very complex and determining if these other perturbation methods would supply the required energy to initiate the selforganization of the rotaxane or catenane molecules would require undue experimentation.

Claim Rejections - 35 USC § 102

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 18, 22, 25, 29, 30, and 34-38 are rejected under 35 U.S.C. 102(a) as being anticipated by Cavallini et al. (2003) for the reasons listed in the previous office action.

6. Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Claim Rejections - 35 USC § 103

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cavallini et al. (2003) in view of "Conformational Self-Recognition as the Origin of Dewetting in Bistable Molecular Surfaces" by Cavallini et al (2001) for the reasons listed in the previous office action.

9. Claims 19-21, 23, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cavallini et al (2003) in view of Mirkin et al ('979) for the reasons listed in the previous office action.

10. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cavallini et al (2003) in view of "Printing meets lithography: Soft approaches to high-resolution patterning" by Michel et al (2001) for the reasons listed in the previous office action.

11. Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Response to Arguments

12. Applicant's arguments filed 4 March 2007 have been fully considered but they are not persuasive. An English translation of the certified copy of the foreign priority document has not been made of record.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Burkhart whose telephone number is (571) 272-6647. The examiner can normally be reached on Monday-Thursday, 7:00 AM-5:30 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

eab

TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER